3D ARMS x MIDDLETON MADE

Apple Pie Pump Action AR-15 - README

You are responsible for your own safety

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Introduction

The Apple Pie is a pump action AR-15 designed as a fun and simple project using parts you may already have laying around. It can be printed in any AR-15 caliber that operates with a locked bolt. It has been tested successfully in 5.56, 7.62x39, 300BLK, and .458 SOCOM. It will not function with pistol calibers, however 22lr conversion bolts will work, although in semi-auto with the pump acting as a forward charging handle.

If you post photographs or videos, we would love to see them. Feel free to tag us or send them to our social media pages.

Not Legal Advice

Free men don't ask, and I'm not your dad. That being said, the upper receiver is understood to be 50 state legal at the time of writing this. Some states currently regulate printing the "firearm" and therefore the lower may not be legal to print in your jurisdiction. Due to this, we have included an upper that can function with a mil-spec metal lower receiver, and another that can function with most popular printed lowers.

While we prefer the "whole pie", that may not be the best option for you.

Printing

Filament Type - PLA+, PLA PRO, Filled Nylons

For any parts that receive stress, do **not** use metallic, silk, glow in the dark, fluorescent, or any other "special" type of filament. Stick with regular, single color PLA+ or better. Print at your own risk.

Esun pla+ and Polymaker pla pro are generally recommended by the community.

Printing Instructions

3D Arms typically uses 10 walls, 99% infill, a brim, and tree supports. Middleton Made typically uses between 10-16 walls, 60-90% gyroid infill, tree supports, and a skirt. Support is recommended on all prints. Your printer and material may require different settings to get a strong and clean print. May the signal be with you.

Which Files to Print

Upper

There are three uppers that can be printed. The upper to be printed depends on what lower you will be putting it on; the Apple Pie lower, another printed lower, or a mil-spec metal lower. The standard apple pie upper/lower is rated for all ar-15 calibers and has been tested up to .458 SOCOM. The upper compatible with other printed lowers, such as a UBAR or Hoffman lower, as well as the upper for mil-spec metal lowers are only rated for 5.56 and 300 BLK because the dimensional limitations of the take down pins result in a weak point. These two uppers are only included for convenience, and are structurally inferior to the standard option. That being said, the potential failure of the takedown pin holes is not a dangerous failure mode.

Bolt Carrier

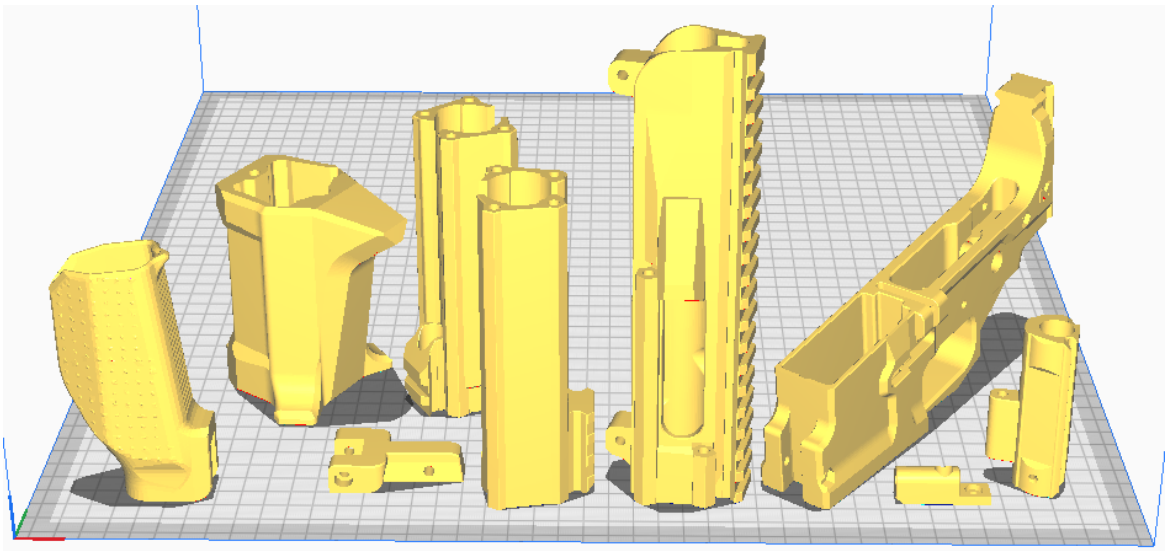
If you are using the Apple Pie lower, you can use our printed carrier, or you can chop a metal carrier and print a replacement gas key. If you use a lower with a buffer tube, you also have the option of using a metal carrier without chopping it.

Handguard

There are multiple handguards that are named based on the locations of picatinny rails from the perspective of the shooter. If you want a flashlight or other accessory on your firearm, you may one to use one of the alternative handguards.

All other files only have one option to print.

Recommended Orientations



Assembly

To start, you'll need:

Printed Parts:

- Upper Receiver
- Barrel Nut
- Handguard
- Chopped Carrier **or** Gas Key
- Pump
- Lower Receiver
- Grip

- Optional brace or stock. For aesthetic matching, we recommend one of the MiddletonMade designs, however there are many great designs available from other developers.

Store Bought Parts:

- AR-15 BCG minus carrier, Barrel, LPK.
- AR-15 low profile gas block (set screw style) or a welder to close the gas port. If the gas length of your barrel is mid length you will need a welder to close the gas port.
- 3 (36”) 8-32 threaded rods (cut to roughly 300mm, 300mm, 380mm, 330mm, 320mm). You will cut them during assembly.
- 8 8-32 nuts.
- 3 m4x25 socket head bolts and nuts (You can substitute 8-32 hardware with a little reaming if desired.
- Glock 17 recoil spring of standard or greater power (optional but recommended).
- Blue loctite (Strongly Recommended)
- Red loctite (Recommended if using a gas block)

Tools

- Wrench or pliers
- 3/32 hex or allen for gas block
- 4mm Allen key for m4 bolts
- Some means to cut the threaded rod. A dremel, a hacksaw, or a file would work.
- A set of standard (inch based) drill bits for reaming holes on the lower.

Step-by-Step

Most of the assembly can be done simply by looking at the photographs but here is a way-too-detailed breakdown of steps if you like.

BCG assembly

1. If you are using the printed carrier, simply transfer the parts from your metal carrier to it and continue to barrel assembly.
2. If you would prefer to use the metal carrier, you can remove the gas key from the metal carrier. It is recommended that you remove the rear screw and then the front screw as this will make it easier to tap the front screw loose from the gas key if it was properly staked.
3. If your lower has a buffer tube, there is no need to cut the carrier, but if not, you will want to cut the rear of the carrier off flush with where the rear of the firing pin exits the carrier.
4. Replace the gas key with the printed key. This is not as strong as the printed carrier and you need to be careful not to over tighten the gas key screws. Blue loctite is recommended here.

Barrel assembly

1. The gas port needs to be closed. This can be done permanently with a welder, or alternatively by putting a gas block on upside down.
2. When aligning the gas block upside down, look through the set screw holes and one of them should align with the gas port. If not take the block off, turn it so the other side faces forwards, and put it back on. Red loctite is recommended here.

Lower assembly

1. Assembly is like an AR lower minus a few parts.
2. Trigger pins should be reamed out with a 5/32” drill bit, or less optimally by putting the pin into your drill and running it through using friction to melt the hole. You do you.
3. Safety should be reamed out with a 3/8” drill bit.
4. Safety detent hole should be reamed with a 5/32” drill bit. If you’re good, you can only go halfway through and have a nice crisp safety.
5. The bolt catch detent hole can be reamed with a 5/32” bit if needed. Be especially careful here, you may want to drill in reverse.
6. Installing the parts follows the norm of AR15 parts installation. Youtube videos may be helpful if needed.

Upper assembly

1. Insert an 8-32 nut into the upper and thread an 8-32 rods into it. Add the first and second half of the handguard and then measure where you will need to cut the 8-32 rod ensuring you account for the nut and a few extra mm in case your cut is off.
2. Repeat for the other three rods that hold the handguard pieces to the upper.

3. Now it's time to measure for the rod that will connect the pump grip to the bolt carrier.
4. Install a threaded rod of at least 13 inches into the bolt carrier with a nut on either side.
5. It is recommended to leave some excess on the rear but not so much that it protrudes past the rearmost portion of the printed portion. This will allow for forward adjustments later if needed.
6. With the threaded rods for the upper installed, slide the first portion of the handguard onto the upper.
7. Slide the pump onto the handguard and all the way back.
8. Install the bolt carrier group into the upper with the rod going through the hole in the upper and through the hole in the pump.
9. Install the partially assembled upper onto the lower.
10. Insert an empty magazine and push the rod backwards until the bolt is past the bolt catch.
11. With the pump pressed backward toward the receiver and the connecting rod pulled forwards, mark on the connecting rod where it exits the pump. A file or marker works for this.
12. Disassemble and cut. You are now ready to do a test assembly and function test of the upper.

Test assembly

1. Reassemble with the barrel in the upper and put the BCG back in
2. For the test assembly I probably wouldn't put the glock spring in as it makes assembly a little harder, but you can. It goes on the threaded rod between the upper and pump before any nuts are threaded.
3. Take the pump off and thread a nut onto it enough that the pump can be fully slid on, and then some.
4. Screw a nut onto the end of the threaded rod until flush with the end, then unscrew the nut behind the pump so as to clamp the pump.
5. Install the second portion of the handguard and finger tighten nuts to hold it all together.

Function test

1. With an empty magazine inserted, pull the pump all the way back, then push forwards to ensure the bolt catch has engaged. If not, use some of the excess at the rear of the carrier to move the carrier backwards and try again.
2. With the magazine removed, push the pump forwards until it stops. Looking through the magwell, you should be able to see that the BCG is in the forward-most position touching the barrel. There should also be a small gap between the front of the pump and the end of the handguard.
3. If the gap is aesthetically too large, you may move the threaded rod forwards using the excess at the back as previously described. If the pump hits the front of the handguard, you will need to adjust in the opposite direction (you will have to disassemble and reassemble). There does need to be a gap, however small it be, or your bolt carrier won't move all the way forwards and you will have light strikes or no strikes.
4. If the bolt moves back enough to engage the catch, and forwards enough to fully enter battery, your gun is ready for loctite.

Loctite

1. The nuts that need loctite are those on either side of the BCG, the four in the upper, and then once those cure, the four on the end of the handguard. If you use the glock spring, the pump adjacent nuts do not need any loctite, but if not, the nut on the rear of the pump should receive blue loctite.

FAQ/Troubleshooting

Q: What kind of round count can I expect?

A: The upper with the highest round count as of publishing is at 1100 of 5.56 and still going strong. Depending on the caliber, it could presumably last much more than that. Other uppers have round counts in the hundreds and one has been tested with 458 socom with no issues.

Q: I have a suppressor and it's not whisper quiet, why is that?

A: Ensure the gas port is blocked. If so, then try subsonic ammo.

Q: it takes a lot of force to push the BCG fully into battery

A: This is partially due to the design of the AR15 bolt, which normally has a lot of momentum as it chambers. You can take the extractor and ejector springs and clip a loop or more off of each, but you may want to have some spares on hand if you cut too much or you might not be able to extract casings.

Q: What if I don't fully seat the bolt and then pull the trigger?

A: A dead trigger will result. The firing pin cannot reach the primer unless the carrier is in the forwardmost position. You will have to charge the weapon, ejecting the live round, and rechamber a new round.

Q: I'm scared of an out of battery detonation. What prevents that?

A: For the firing pin to reach the primer, the bolt has to have rotated and then be pushed all the way forwards. If the bolt has rotated, the lugs are locked. This prevents an OOB. If you were to

pull the pump back 1mm (0.04”) the firing pin would not be able to reach the primer, yet the lugs would still be locked. A dead trigger would result.

Q: My bolt turns prematurely resulting in it getting stuck, and not chambering rounds

A: Take the bolt out of the bolt carrier and find a spring that slides over the stem (portion that enters the carrier). If cut to the right length, this will provide forward tension to the bolt and should fix this issue. I was never able to replicate the problem, but I did test the fix with a clip of spring from a CMMG 22lr magazine spring. Ensure the bolt still has full range of motion within the cam slot. If you do this, you will need to apply forward pressure to the pump when firing or you will have a dead trigger. This is because the spring will try to push the bolt and carrier apart, pushing the pump handle backwards which results in the firing pin not reaching the primer.

Q: I have a stuck casing, can I mortar it?

A: I mean… it’s your gun, but go easy because it totally might break. That’s how two people broke an earlier weaker version of the pump. Best of luck.

Q: I am getting light strikes and dead triggers. What it do?

A: The most likely reason is that you’re applying rearward pressure to the pump grip while pulling the trigger. With most long guns that would be a good habit, so you are likely doing so without realizing it. Pulling rearward pulls the carrier rearward and now the firing pin can no longer reach the primer. Good practice with the Apple Pie is to push forward with the forward hand and pull back with the trigger hand.

A: Another option is that the front of your pump is hitting the handguard causing it to stop prematurely. Verify there is a gap between the two when in the forwardmost position. Next, look through the magwell and confirm the carrier is contacting the barrel, otherwise there is an interference.

Q: There is a gap between the upper and the “barrel nut”, why is that?

A: In the upper, the indentation for the flange of the barrel is too shallow. This could be from your support settings, but regardless, scraping lightly with a chisel to deepen this pocket will fix the issue.